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Developmental and behavioral problems in pediatric primary care

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CHAPTER 01

GENERAL INTRODUCTION

This thesis concerns the early identification of developmental and behavioral problems in pediatric primary care. It focuses on the assessment of communication problems in early childhood and on the identification of emotional and behavioral problems by teachers. In this first chapter the broader context of this thesis and its core concepts are described. We will discuss the various concepts of child development and behavior as used in this thesis. The importance of the social environment on early child development will be emphasized. Since studies have been both conducted in the Netherlands and Canada differences between these countries will be highlighted. At the end of this chapter we will discuss the different research questions of our study.

Child development and behavior

Child development and behavior are the central concepts in this thesis. Child development refers to the evolution of capacities in a child, which is the reflection of the maturation of the central nervous system.¹ Major areas of child development are:¹⁻³

1. Gross motor: performance of large muscles groups (e.g. running, jumping, climbing stairs)
 2. Fine motor: performance of small muscles groups (e.g. building blocks, picking up objects)
 3. Language and communication: skills in receptive language (i.e. what the child can understand) and expressive language (i.e. what the child can say) as well as in gestures and other non-verbal communication
 4. Social development: attachment, level of cooperative play, empathy
 5. Cognitive development: learning & thinking, information processing, problem-solving
- Developmental skills are acquired sequentially, with one performance skill (e.g. sitting) acquired after another (e.g. walking).³ Moreover, development on various domains interacts. For example, the emergence of motor skills also plays an important role in cognitive and language development.⁴

Development and behavior are closely connected in children, but conceptually they are separate.¹ A child's behavior is defined as the style (how a child behaves) and content of his or her actions (what he or she actually does).¹ The *behavior style* of a child is called temperament and is often explained as the "how" of behavior and closely related to a child's personality.^{1,5} Temperament is defined as a biologically based individual differences in reactivity and self-regulation, influenced over time by heredity and experience.⁶ Each child can be considered to have three main reactive dispositions of temperament: 1) extraversion/ surgency (e.g. positive emotionality, activity, impulsivity), 2) negative affectivity (e.g. sadness, discomfort) and 3) effortful control (e.g. attention shifting, focusing, inhibitory and activational control). The *content of behavior* can be described as child's behavioral adjustment to the environment.¹ This behavioral content may be derived

from or interact with a child's developmental status and individual temperament, but is considered a distinct characteristic of the child.¹

The outcome of a child's development has been described by Bronfenbrenner's ecological model as the product of the interaction between the child's characteristics (including genetics, temperament, health status) and the environment (including physical, chemical and social circumstances).^{1,7} The social environment is considered a fundamental determinant of early child development and, in turn, early child development is a major determinant of health, well-being and learning skills across the life course.⁸ Social environments that do not stimulate healthy child development have an ongoing negative impact on a range of social, economic and learning outcomes of a child.³ From a policy perspective, however, it is not clear how the social environment in early childhood can be supported. In the Chapter 2 of this thesis we have investigated four social determinants of health important in the early years of child development; prenatal care, maternal leave, child health care, and child care and early childhood education. For each of these social determinants we will compare the organization of services and health outcomes in five countries with different redistributive policies, including the Netherlands and Canada.

Developmental and behavioral problems in children: prevalence and consequences

Developmental problems in children include disorders or delays in any of the developmental domains (motor, language, social and cognitive).¹ In the Netherlands it has been estimated that developmental delay affects 5% to 10% of annually born children.⁹ A 2001 Statistics Canada report showed a much lower prevalence, i.e. that 1.1% of children aged 0-4 years had a developmental delay.¹⁰ However, recent reports from the United States have indicated a higher prevalence of 13% of children between 9 and 24 months that experience developmental delays.¹¹

As a definition of behavioral problems we use in these thesis: problems that children experience in reacting to the environment.¹ We divided behavioral problems in: (1) behavioral / externalizing behavior (e.g. hyperactivity, aggressive and delinquent behavior) (2) emotional / internalizing behavior (e.g. depression, anxiety).¹² In the Netherlands, 11% children (3-18 years) have been estimated to have externalizing behavioral problems and 8% internalizing problems (children 0 -12 years) according to parental ratings on mental health questionnaires.^{13,14} In Canada the most recent estimate is that 12.6% of children and youth (between 4 -17 years) experience mental health disorders based on the Diagnostic and Statistical Manual of Mental Disorders (DSM) criteria.¹⁵

Importantly, the prevalence estimates described above do not take into account that a majority of children will never acquire a specific diagnosis of a developmental or behavioral disorder, but despite this they experience persistent difficulties in behavior, attention,

language or other domains of development impacting their individual potential.¹⁶ In addition, both developmental and behavioral problems often occur in the same child, for example a child with a language delay can have significant behavior problems and a delay in motor performance of a child can have a great impact on his or her psychosocial development.^{17,18}

In the USA, speech problems, learning disability, attention deficit/ hyperactivity disorder (ADHD) were reported in 2009 as the top 3 conditions contributing to limitations in children's activities.¹⁹ Both developmental and behavioral problems in early childhood are identified as important precursors for mental health disorders later in life.²⁰ Prevention of mental health disorders might be possible with early recognition of developmental and behavioral problems in childhood and prompt mental health treatment.²¹

Pediatric Primary Care

Primary care is defined as “ the central focus of a country's health system, providing the first level of contact for individuals, family and community, providing universally accessible services as close as possible to where people live and work, and providing the first element of a life-long health process”.²² Primary care is often the main pillar of care for children.²² Different models are employed in the organization of pediatric primary care; the medical workforce that delivers it, the use of services for urgent or emergency problems, the type of care for children with long-term conditions, and the role of disease prevention and health promotion.²²

In the Netherlands two major professions provide pediatric primary care; preventive child health specialists (including medical doctors and nurses specialized in preventive child healthcare) and family physicians. For children between 0-4 years preventive child healthcare (PCH) takes place in specific “child health centers”. The Dutch PCH is free of charge for all families, regardless of health insurance status and more than 90% of all children regularly visit PCH.²³ The goal of the PCH is to monitor the physical, social, psychological and cognitive development of children and to inform parents about normal development in all these areas. From birth to 4 years Dutch children have 15 routine examinations in child health centers.²⁴ Traditionally the main focus of these examinations has been on physical development, but in the last years there is more attention for psychosocial problems in children.²⁵ Acute pediatric care is provided by family physicians at all hours of the day and if necessary these family physicians refer to a pediatrician. In the Netherlands, pediatricians work mainly in hospitals and are responsible for hospitalized pediatric patients and for providing consultation clinics.

In Canada, pediatric primary care is provided by many different professionals; family physicians, pediatricians, nurse practitioners and public health nurses.²⁶ Access to these professionals is determined by parental preference and/or awareness, geographic location and availability. In Canada six preventive child healthcare visits are recommended in the

first 18 months. In 2009 in Ontario an enhanced 18-month well-baby visit was introduced with a focus on early child development.²⁷ The 18-month visit is the last regularly scheduled primary care encounter (involving immunizations) before school entry; therefore it was recommended that the focus needed to shift from a well-baby check-up to an assessment of developmental health.²⁷ Acute pediatric care is offered by family physicians, pediatricians and ‘walk-in-clinics’ within office hours. For out-of-hours acute pediatric care parents often need to go to “walk-in-clinics” or hospital emergency departments.

Identification of developmental and behavioral problems in pediatric primary care

The importance of screening and surveillance for developmental problems in children is widely recognized by experts.^{14,17} In the study of Sheldrick et al. pediatric primary care providers who worked without screening instruments achieved 70% specificity and 54% sensitivity in correctly identifying children having a developmental or behavioral problem.¹⁷ The American Academy of Pediatrics (AAP) recommends using a standardized tool in the screening for developmental delay.²⁸ A study by Brugman *et al.* conducted in the Netherlands demonstrated that preventive healthcare specialists who worked without screening instruments did not identify psychosocial problems in 43% of children aged 4-15 years with emotional and behavioral problems in the clinical range.²⁹ For children aged 21 months – 4 years, this was 71%.³⁰ Vogels et al., de Wolff et al. and Theunissen et al. demonstrated that the use of validated questionnaires can add significantly to the detection of emotional and behavioral problems in PCH.³¹⁻³³ Theunissen et al. further showed that work experience and work style determined a substantial part of the variation in detection among preventive child health physicians.³⁴

There are a large number of developmental and behavioral screening instruments available. Developmental and behavioral screening instruments have different purposes (general screening tool versus screening for a more specific problem) and use different methods (e.g. parent report versus practitioner administered). In Chapter 3 we will discuss the use of a broad developmental checklist in the early detection of communication problems in pediatric primary care. In Chapter 4 and 5 we will discuss the identification of emotional and behavioral problems by teachers.

Early detection of communication problems

Communication problems are often the first presenting problem in young children with developmental disabilities.^{35,36} Children with communication problems have poorer outcomes in reading, spelling, math skills and increased emotional and behavioral difficulties.^{37,38} The identification of developmental problems in speech and language acquisition is a core activity of preventive child health care.³⁹

In Canada, the Nipissing District Developmental Screen (NDDS) was created as a broad developmental checklist for infants and children for use in pediatric primary care.⁴⁰ The Canadian Paediatric Society recommended the NDDS as one of the developmental screening tools that could be used at the 18-month well-baby visit.²⁷ The NDDS is a parent-completed questionnaire that addresses development in the following areas: fine motor, gross motor, emotional, social, self-help, learning, and thinking and communication.⁴⁰ The psychometric properties of the NDDS are not specified and it is currently not known how well the NDDS can detect communication problems at the 18-month developmental surveillance visit.

Therefore, in Chapter 3 of this thesis we compared the 18-month NDDS with a validated questionnaire for detecting communication delays; the Infant Toddler Checklist (ITC). The ITC is a standardized 24-item parent completed questionnaire with normative scores for monthly intervals from 6 -24 months, with both good sensitivity (88.9%) and specificity (88.9%) for detecting global developmental delay and autism spectrum disorder (ASD).^{41,42}

Identification of emotional and behavioral problems: the role of teachers

The use of short parental questionnaires in the early identification of emotional and behavioral problems in children has been investigated by Theunissen et al (children 3-4 years) and by Vogels (children 7 -12 years).^{31,33,43} Less information is available about the early identification of emotional and behavioral problems by teachers with the use of questionnaires. Multi-informant data are preferable for assessing emotional and behavioral problems in children.⁴⁴ Children may display behavioral problems in some contexts (for example at home) but not in other situations (for example with peer interactions).⁴⁵ Teachers are well acknowledged informants of children's behavior because they see children on a daily basis in the school environment and have the opportunity to compare behavior of children of similar age every day.⁴⁴ Identifying the specific contexts in which children display emotional and behavioral problems and its impact on school functioning, may also facilitate treatment of these problems.⁴⁵

Several questionnaires for teachers have been developed to help identify emotional and behavioral problems in children. The Achenbach Teacher's Report Form (TRF) is often regarded as a gold standard among broadband behavior rating scales for teachers.^{46,47} It has questions across eight syndrome scales (Anxious /Depressed, Withdrawn/Depressed, Somatic Complaints, Social Problems, Thought Problems, Attention Problems, Rule-breaking Behavior and Aggressive Behavior) and two broadband scales (internalizing and externalizing problems).^{46,47} The TRF has been extensively investigated and found to be highly reliable and valid, in all age groups and among many countries and cultures.⁴⁷ However, for routine use a major disadvantage is its length, as it includes 113 items.

The Strengths and Difficulties Questionnaire (SDQ) has quickly become one of the most utilized screening instruments because of its brevity and its ability to measure both problem

behavior and competencies.⁴⁸⁻⁵⁰ The SDQ has a parent, teacher- and adolescent version available. The SDQ consists of 25 items subdivided into four difficulties scales, emotional symptoms, conduct problems, hyperactivity-inattention, peer problems, and a separate fifth strength scale, prosocial behavior. The parent- and adolescent-report versions of the SDQ have been shown to have good psychometric properties.^{49,51-57} In contrast, the teacher version of the SDQ (SDQ-T) has not been well investigated in school children in a broad age range.⁵⁸⁻⁶⁰ It would be ideal for pediatric primary care professionals to use the same, short questionnaire for both parents and teachers to express their concerns about emotional and behavioral problems. In Chapter 4 of this thesis we will assess the reliability and validity of the teacher version of the SDQ-T in a population of school children in the Netherlands.

Identification of emotional and behavioral problems: the role of teachers in children with developmental coordination disorder

Developmental Coordination Disorder (DCD) is a common disorder affecting motor coordination in school-aged children, affecting 6% of all children.⁶¹ Research has shown that motor performance greatly impacts psychosocial development of children.⁶² Children with DCD not only show significantly higher internalizing behavior, but also showed higher externalizing behavior compared with peers.^{63,64} Up to 50% of children with DCD have been shown also to meet criteria ADHD.⁶⁵

Current evidence on the co-occurrence of DCD and emotional and behavioral problems mainly concerns parent-reported information and rarely includes teacher reports.^{62,63,66-69} Since DCD is a common motor problem in school-aged children, more insight is needed in the teacher's identification of emotional and behavioral problems in children with DCD. Although the parent version of the SDQ has been used in children with DCD, it is not known if the teacher version of the SDQ could identify the same emotional and behavioral problems in children with DCD as a more extensive questionnaire like the TRF. In Chapter 5 we will evaluate the teachers' identification of emotional and behavioral problems in children with DCD, using both the TRF and SDQ-T in school children in the Netherlands.

The relation of early childhood temperament and nutrition

Nutrition plays an essential role in growth, development and in the social- and emotional well-being of children.^{70,71} Important examples of nutrition related risk factors and health outcomes in young children include prolonged bottle use contributing to iron deficiency and increased screen time and excessive intake of sugar sweetened beverages contributing to obesity.^{71,72} Recognizing early signs of nutrition related risk factors could help identifying children who require interventions. In Canada, a Nutrition Screening Tool for Every Preschooler (NutriSTEP) has been developed to assess nutrition risk in preschool children.⁷⁰ The NutriSTEP[®] includes 17 questions about nutritional risk factors including five domains;

eating behaviors, dietary intake, parental concerns about food and activity, screen time duration and the use of supplements.⁷⁰

An important child factor contributing to his or her nutrition is child temperament.^{73,74} Temperament may be related to nutrition by evoking particular responses from caregivers; for example infants who are higher on negative affectivity may be fed more as an attempt to soothe their distress.⁷⁵ Additionally children with lower self-regulation may have a difficult time resisting the energy-dense, palatable foods that are prevalent in the current environment.⁷⁵

No studies have investigated the longitudinal influence of child temperament on nutritional risk factors in preschool children. In Chapter 6 we have investigated whether temperament dimensions (negative affectivity, effortful control and surgency) in early childhood are associated with later nutritional risk factors.

Research questions and outline of this thesis:

This thesis aims to contribute to the early detection of developmental and behavioral problems in pediatric primary care by addressing a number of research questions:

1. What is the influence of redistributive policies on early child development services and outcomes?
2. How well does the Nipissing District Developmental Screen (NDDS) identify communication problems in infants?
3. What is the reliability and validity of the teacher version of the Strengths and Difficulties Questionnaire (SDQ-T)?
4. What is the risk of emotional and behavioral problems identified by teachers in children with Developmental Coordination Disorder (DCD) compared with their peers? How well does the SDQ-T perform compared to the TRF in children with DCD?
5. Is temperament (negative affectivity, effortful control and surgency) in early childhood associated with later nutritional risk factors?

In Chapter 2 we describe our examination of the social environment of early child development in countries with different redistributive policies, including the Netherlands and Canada. The objective of this study was to highlight similarities and differences in social and health services between countries and their associations with other health outcomes to inform better early child development policies.

In Chapter 3 we report how well the Nipissing District Developmental Screen (NDDS) identifies communication problems in 18-month infants in Canada. We assessed the diagnostic properties (sensitivity, specificity) and validity (Cohen's kappa) of the 18-month NDDS with the Infant Toddler Checklist (ITC) used as criterion measure.

In Chapter 4 we describe our assessment of the reliability (internal consistency) and validity

(Spearman's correlation, sensitivity and specificity) of the teacher version of the Strengths and Difficulties Questionnaire (SDQ-T) in primary school children in the Netherlands. In these analyses we compared the SDQ-T with the Teacher's Report Form (TRF).

In Chapter 5 we describe the teachers' identification of emotional and behavioral problems in children with Developmental Coordination Disorder (DCD) in the Netherlands. Secondly we explore the performance of the SDQ-T compared with the TRF in children with DCD.

In Chapter 6 we report about our study investigating the association between early childhood temperament dimensions (negative affectivity, effortful control and surgency) and the association with later nutritional risk factors in primary care children in Canada.

In Chapter 7 we discuss our findings and give recommendations for further research.

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